

APPENDIX A

STATEMENT OF WORK FOR THE QUENDALL TERMINALS REMEDY DEFINITION STUDY

Renton, WA

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1.0 INTRODUCTION

1.1 General

This Statement of Work (SOW) describes the work to be conducted by Potentially Responsible Parties (PRPs) to collect data to refine the conceptual site model (CSM) to support optimization and definition of remedial treatment compartments at the Quendall Terminals Site (Site). This work will be performed pursuant to an Administrative Settlement Agreement and Order on Consent (AOC) with the U.S. Environmental Protection Agency (EPA).

For the purposes of the Feasibility Study (FS), EPA identified all soil and sediments containing dense non-aqueous phase liquid (DNAPL); including oil-wetted and oil-coated materials as Principal Threat Waste (PTW). The FS identified the following Source Control (SC) Remedial Action Objectives (RAOs) for Site PTWs:

- **SC1: PTW.** Treat or remove DNAPL in subsurface soils and groundwater to prevent contamination of groundwater above constituents of concern (COC) maximum contaminant levels (MCLs) to the extent practicable.
- **SC2: PTW.** Contain DNAPL in subsurface soils and groundwater where treatment or removal is not practicable.

It is anticipated that the preferred remedy will provide for *in situ* solidification (ISS) of certain upland soils and dredging of certain sediments to achieve these objectives. For the purpose of comparing and evaluating remedial alternatives, the FS presented approximate areas, based on existing data, over which of these remedial alternatives could be implemented. Determining the actual extent of treatment and dredging will be optimized through additional delineation of DNAPL occurrences. Specific criteria for defining boundaries for treatment compartments will be developed with EPA as data is collected and the CSM is updated.

Additional information regarding the specific extent of treatment and removal will assist in further defining the scope of the preferred remedy, facilitate preparation of the Proposed Plan and allow estimated remedial costs to be refined. This SOW identifies the work required to address these data needs.

The FS will be finalized in 2016. This SOW will be conducted in parallel with finalizing the FS, and will be used to support development of the Proposed Plan.

1.2 Oversight

All work products submitted to EPA are subject to EPA approval. The PRPs shall ensure that all plans, reports, and records are comprehensive, accurate, and consistent in content and format with the National Contingency Plan (NCP) and relevant EPA guidance unless otherwise specified by EPA.

The PRPs shall prepare and submit Quarterly Progress Reports to EPA to aid in project planning. These reports will document the status of all work products under development pursuant to this SOW. These reports shall describe the actions taken, problems encountered during the previous quarter, and activities scheduled during the upcoming reporting period. These reports shall also summarize the extent to which the procedures and dates set forth in the AOC, this SOW, and any work plans are being met. These reports shall be submitted according to the schedule in Table 1.

2.0 Remedy Definition Study

2.1 General

The PRPs shall conduct a Remedy Definition Study (RDS) to optimize the boundaries for remedial compartments under EPA's preferred remedy. This information will be used to develop a more accurate estimate of remedial costs and describe the preferred remedy in the Proposed Plan.

2.2 Remedy Definition Study

The primary objectives of the RDS are to refine the boundaries for upland soil treatment and the extent of sediment dredging. The RDS will achieve these objectives through a data collection and analysis program as follows:

- Determine the lateral and vertical extent and thickness of DNAPL in soil and sediment using TarGOST and/or completion of soil borings with soil sampling and visual observations.
- Collect samples of DNAPL-impacted soil and sediment for laboratory analysis, to confirm field observations of DNAPL and determine DNAPL chemical characteristics in different locations.
- Collect groundwater samples in and downgradient of DNAPL areas, to evaluate the impact to groundwater in each area.
- Use a collaborative approach between EPA and the PRP team members to conduct real-time review and analysis of DNAPL observations, correlate areas of DNAPL occurrences and identify potential criteria for treatment/removal, and refine the sampling scope as needed to address areas of uncertainty.
- Update the groundwater model to reflect current plume conditions based on the collected data.

The RDS shall include four tasks: a work plan, field investigation, groundwater modeling, and reporting. These tasks are described below.

Task 1—Work Plan

This task will involve preparation of an RDS Work Plan (Work Plan) which identifies the objectives of the potential preferred remedy, the data needed to define the scope of the potential preferred remedy, data quality objectives for the work, the work to be performed, and the methods to be used to document the work.

The Work Plan will include a schedule for conducting the work, a project management plan that identifies team-member roles and responsibilities, a description of the systematic planning process, including Data Quality Objectives (DQOs) to conduct the work, a Sampling and Quality Assurance Project Plan (SQAPP) that will identify sampling, analysis, and quality assurance procedures to be conducted, and a health and safety plan (HASP) that will be prepared in compliance with Occupational Safety and Health Administration (OSHA) regulations and protocols.

The Work Plan will include the following data collection elements:

- A Site-specific bench study (bench study) to evaluate the effectiveness of the TarGOST technology to delineate DNAPL in soil and sediments. The objectives of the bench study will be to evaluate if DNAPL materials can be adequately distinguished from non-DNAPL organic materials (peat, wood debris) present at the Site.
- A plan for delineating the lateral and vertical extent and thickness of DNAPL throughout areas of DNAPL occurrences. To provide sufficient precision, upland DNAPL areas will be delineated on a minimum 50-foot by 50-foot grid and sediment DNAPL areas will be delineated on a minimum 50-foot by 50-foot grid. Greater density may be warranted in certain areas, such as near edges of DNAPL occurrences. Methodology will depend on the results of the bench study, as follows:
 - If the results of the bench study are favorable, DNAPL delineation will be conducted primarily using TarGOST technology. The investigation work would include collocated continuous soil cores collected at a subset of locations using conventional drilling technologies to visually identify DNAPL.
 - If the results of the bench study are not favorable, DNAPL delineation will be conducted using visual observation and field testing of continuous soil cores collected with conventional drilling technologies.
- A coordination plan that describes how data will be communicated and evaluated, how the CSM will be updated, and how the scope of work may be adapted as data is collected. Field data will be shared as it is generated, and visualization tools will be used to represent DNAPL occurrences and aid decision making. The coordination plan will identify the process for modifying the proposed scope if appropriate.
- A sampling and analysis plan for collecting and submitting for laboratory analysis representative samples of DNAPL-containing soil and sediment, and of groundwater from locations downgradient of DNAPL occurrences, using direct-push drilling. Soil, sediment and groundwater samples will be analyzed for volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs). These data will be used to confirm DNAPL presence, evaluate DNAPL chemical composition in different areas, and assess the impact to groundwater in each area.
- A plan for installing and sampling additional groundwater monitoring wells in the Deeper Aquifer. The purpose of these wells is to better delineate VOCs (including benzene), PAHs, and arsenic occurrences in the Deeper Aquifer. This information will be used to help determine the contribution of different DNAPL areas to groundwater contamination and to calibrate the groundwater model. The number and location of wells will be determined after the DNAPL delineation and sampling is completed.

Task 2—Field Investigation

The field investigation will involve conducting sampling and analysis according to the Work Plan and SQAPP. PRPs will initiate field support activities following approval of the Work Plan. Field support activities include scheduling, procuring equipment, laboratory services, and/or contractors. PRPs will notify EPA at least two weeks in advance of the field work regarding the planned dates for field activities. Information gathered during Site characterization shall be documented and adequately recorded by PRPs in well-maintained field logs and laboratory reports. The method(s) of documentation will be specified in the Work Plan. Field logs must be utilized to document observations, measurements, and significant events that have occurred during field activities. Laboratory reports must document: sample custody; analytical

responsibility; analytical results; adherence to prescribed protocols, nonconformity events and corrections thereof; and/or data deficiencies. PRPs shall maintain field reports, sample shipment records, analytical results, and quality assurance/quality control (QA/QC) reports.

- It is anticipated that field activities will be conducted in close coordination with EPA for the purposes of evaluating data as it is collected and optimizing the investigation as it proceeds. Coordination and decision-making protocols will be described in the Work Plan. The EPA will consider input from all parties involved in this field work, however, the EPA will maintain ultimate decision making authority regarding changes to the sampling design based on field conditions and findings.

Task 3—Modeling

Data collected during the field investigation will be used to update the groundwater fate-and-transport model developed in the FS. The purpose of the revised model will be to more accurately represent current groundwater conditions. The model is not anticipated to be used to predict remedy performance for the purposes of selecting a remedy; however, it is expected that the model will be updated during remedial design and implementation to assist in performance evaluations. Additionally, as recommended by the Remedy Review Board, the model will evaluate groundwater flow and determine the potential for ponding, redirection and flooding due to in-situ solidification.

Task 4—Reporting

A Remedy Definition Report (RDR) will be prepared after the field investigation and updated groundwater modeling is completed. The RDR will include the following:

- Documentation of field activities;
- Summary of collected data;
- Updated site CSM;
- Summary of criteria and analyses used to determine areas of treatment or removal;
- Identification of specific areas to be potentially treated or removed;
- An assessment of other data that may be needed to refine treatment areas as part of design, if identified; and
- An updated cost estimate for the preferred remedy.

3.0 SCHEDULE

Refer to Table 1 for a summary of the deliverables required by this SOW and the associated schedule for submission of those deliverables.

TABLE 1—Schedule of Project Deliverables¹		
TASK	DELIVERABLE	DUE DATE
Remedy Definition Study Work Plan	Draft Remedy Definition Study Work Plan	Within 60 days after the effective date of the AOC.
	Final Remedy Definition Study Work Plan	Within 30 days of PRPs' receipt of EPA's comments.
Remedy Definition Report	Draft Remedy Definition Report	Within 60 days of PRPs' receipt of validated data from samples collected during Remedy Definition Study.
	Final Remedy Definition Report	Within 30 days of PRPs' receipt of EPA's comments.

¹ All deadlines in this Table are subject to extension as set forth in the Settlement Agreement, including without limitation, for *Force Majeure* events.